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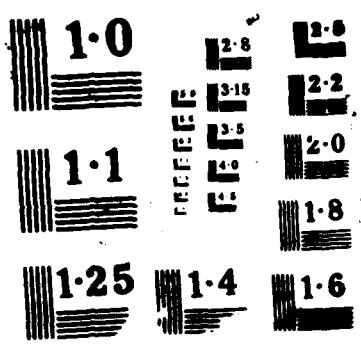
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The 9mm Personal Defense Weapon is now being delivered to the Military Services and the Acquisition Contract does not call for bar coding any information on the exterior of the pistol. The Military Services have expressed interest in laser etching unique identifying information on the pistols and has completed a laser-etched weapons test that shows the idea is feasible. This report addresses two questions: 1) what information should be bar coded? 2) What method of application would minimize the total cost of applying bar codes?

The report recommends that the weapon serial number be the only information encoded, and it recommends that the acquisition contract be modified as soon as possible so that codes will be applied during manufacturing. It also recommends methods for each service to bar code weapons received before the contract is modified.

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**LOGMARS SMALL ARMS-MARKING
FOR THE 9mm PERSONAL
DEFENSE WEAPON**

July 1986

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Executive Summary

**LOGMARS SMALL ARMS-MARKING
FOR THE 9mm PERSONAL DEFENSE WEAPON**

Bar coding can ease the time-consuming task of taking inventory of small arms. A recent Joint Service test proved the feasibility of using laser-etched bar codes for weapons, but the Services must identify what information they need and must develop a procedure for applying the codes to their small arms.

For the 9mm Personal Defense Weapon, we recommend that they be laser etched with bar-coded serial numbers before fielding. The acquisition contract should be modified now to have the weapons encoded at the factory, before packaging, at minimum cost.

Some weapons will have been delivered before the contract can be modified. The Services must have a cost-effective means to mark them. We recommend the acquisition of laser-etching hardware for the Army's and the Marine Corps' receiving activities. Etchers should be leased, if necessary, to permit their rapid acquisition and to minimize impact on fielding schedules. The Air Force should bar code its weapons at Hill Air Force Base, which already has a laser etcher. Since the Navy's deliveries do not start until fiscal year 1987, and the number of unetched weapons delivered before the contract modification takes effect will be small, we recommend that the Navy purchase 9mm etching services from one of the other Services.

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M9 DELIVERY SCHEDULE

1. BACKGROUND

Since completion of the Logistics Applications of Automated Marking and Reading Symbols (LOGMARS) Joint Steering Group Final Report¹ in September 1981, the Military Services and the Defense Logistics Agency (DLA) have undertaken a program of using bar code technology in all applications for which it would be cost effective. For continuing coordination of system development and testing, a DoD LOGMARS Coordinating Group (LCG) representing all the Services, DLA, the General Services Administration (GSA), and the Office of the Assistant Secretary of Defense for Manpower, Reserve Affairs and Logistics [OASD(MRA&L)] was formed in 1982, with the U.S. Army representative serving as permanent chairman and executive agent.

Under the auspices of the LCG, the U.S. Air Force undertook a technical study in 1982 to determine whether coding that could be read by commercially available hand-held scanners could be permanently etched into items, with particular emphasis on small arms. The results of that study,² completed in 1984, indicated that utilizing a laser to etch bar codes on small arms was technically feasible and produced a durable, readable product.

As a result of that study, the U.S. Marine Corps decided to base the development of automated small arms tracking and inventory control systems on the utilization of bar coded weapons. While the development of these bar code applications themselves is a fairly straightforward process, a number of problems

¹U.S. Department of Defense, Final Report of the Joint Steering Group for Logistics Applications of Automated Marking and Reading Symbols, 1 September 1981.

²U.S. Department of Defense, Laser Etched Weapons Test: Final Report, June 1984, (revised August 1985).

must be resolved before the development effort can proceed. One of those problems is the lack of a cost-effective procedure to bar code the large number of weapons already in the Marine Corps inventory and also those that have yet to be fielded.

Of particular interest in this latter category is the new 9mm pistol. A contract has been awarded for some 305,880 weapons, classified as the M9 Personal Defense Weapon. They are to be fielded by the four Military Services over a five-year period beginning in February 1986 to replace aging .45 caliber and .38 caliber pistols. Under the current procurement contract, the weapons are being delivered without bar codes. However, if bar codes can be etched on them at one or more central facilities before fielding, a significant cost savings can be realized. Beretta USA, a subsidiary of the Italian arms manufacturer Fabrica d'Pietro Beretta, has been awarded the DoD contract for the M9. The first year's production is being imported from Italy, with subsequent years' productions assembled at the Beretta plant in Accokeek, MD. The initial shipments of assembled weapons from Italy are being transported monthly by Military Airlift Command aircraft to Dover Air Force Base, DE, from which point they are being distributed to the various Services. Army shipments are sent to Letterkenny Army Depot, Chambersburg, PA; Navy shipments go to Crane Naval Weapons Center, Crane, IN; Marine Corps' to Marine Corps Logistics Base Albany, Albany, GA; and Air Force's to Warner Robbins Air Logistics Center, Warner Robbins, GA. The impending delivery of large numbers of these pistols (detailed in the Appendix) and their subsequent widespread distribution, make the quick development of a marking strategy imperative if the anticipated cost savings are to be realized.

Another problem noted by the Marine Corps in its development of bar coding for small arms tracking and inventory control is the need to precisely identify the data elements to be encoded on the weapon. The etched data must be chosen so as to ensure maximum utility of the coded information at the lowest cost. Among the

considerations in solving this problem is the trade off between the amount of data encoded and the cost of etching, as well as other technical issues such as the transience of the permanently etched data.

The other Services (in particular, the Air Force) have displayed considerable interest in the Marine Corps' answer to these problems in anticipation of the fielding of their own automated systems. Because the M9 is being procured on a Joint-Service basis, a Marine Corp's etching program can serve as the model for a DoD-wide program.

In response to these concerns, the Logistics Management Institute (LMI,) has been tasked to recommend the most suitable means for marking unfielded small arms (in particular the M9) after determining what data should be encoded. Specifically, LMI is tasked to:

- Identify the data elements to be bar coded on the weapons.
- Identify marking program options and strategies to identify where and how marking should take place.
- Conduct a simple cost/benefit analysis for each option and recommend the preferred option.
- Prepare a formal implementation strategy and schedule for each Military Service based on input from the Service.

Because of the imminent fielding of the M9, two studies were requested: the study reported here considers the issues of marking as-yet unfielded weapons (in particular the M9) for all Services, and a second study will deal with the longer-term issues of marking fielded weapons. This report also recommends which data elements should be encoded on small arms.

ASSUMPTIONS

Because of high transportation costs, the negative impact on unit readiness, and the high administrative overhead, we assume that where possible, the M9s will be marked before fielding. Inasmuch as this assumption implies one or more central

etching sites where all pistols have an equal, low-cost opportunity to be etched, we also determined that the entire M9 inventory should be etched. We assume that the technical findings of the DoD Laser-Etched Weapons Test regarding etching times, etcher capacities, etcher service life, and operating costs, are valid. Using that report, we also assumed that:

- The capacity of current laser-etching equipment equipped with material handling attachments is 425 weapons per 8 hour shift.
- In-house etcher operations would require two personnel at a total cost of \$4,467 per month (based on a labor rate of \$12.69/hour and 176 work hours per person per month.)
- Maintenance of a laser etcher requires an average of 20.8 work hours per year at a labor rate of \$15.61/hour. Average monthly cost of maintenance is \$27.

Our cost proposals are based on the assumption that no troop labor will be used. Other assumptions are that fielding cannot be delayed significantly for an etching program, that repackaging costs are a consideration except in the case of production contract modification, and that Service-procured laser etchers will be used to full capacity even though the M9 etching will only represent a portion of the total throughput.

2. FINDINGS

Experience with current weapons inventories indicates that eventual interservice transfer of large quantities of weapons is probably inevitable. Thus, compatibility of automated accounting systems for weapons is essential to their orderly transfer between and among Services. A concerted DoD approach is needed.

We found that the Military Services have not yet agreed on the value of permanently etching bar codes on small arms in general and on the M9 in particular. The Navy believes that its inventory of small arms is too small and too widely distributed for it to realize cost savings from bar coding individual weapons. The Army is undecided about permanently etching bar codes on small arms, although it recognizes the potential of bar code technology in weapons accountability. It is currently exploring an alternative system based on permanently affixed photo imaged labels. (That concept has already been rejected by the Marine Corps and the Air Force for security reasons.) The Air Force and the Marine Corps are currently planning to proceed with the etching of bar codes on all their small arms but have not firmly established a method for doing so.

In addition, the DoD M9 program manager is concerned that laser etching may be detrimental to the durability of the weapon and has required that a protective coating be developed and tested before an etching program is initiated. The testing and approval of this coating is in its final stages at this time. Until final approval of the coating, the program manager will not process a contract modification to laser-etch the weapons.

DATA TO BE ETCHED

Discussions with Marine Corps and other systems development personnel indicated that a "license-plate" approach would be preferred in etching data on the

weapon. This concept uses the information etched on the weapon merely to identify it and maintains any other information about the weapon on magnetic media. The use of this concept avoids the problem of changing the etched bar code as the data concerning the weapon changes. In order to successfully implement this concept, a unique identifier must be etched; the obvious candidate for this identifier is the serial number, which is already stamped into the weapon's frame. The problem of possible duplicate serial numbers both within a weapons type and across weapons types was investigated and found to be of only minor concern. The likelihood of duplicate serial numbers in either category was found to be remote as well as being readily amenable to solution by modification of the application system software. A portable scanner could easily be programmed to display an error code if duplicate serial numbers were encountered, and call for an additional keyboard entry to distinguish between the affected weapons.

At the request of the LOGMARS Coordinating Group the Army has drafted a proposed contract specification for etching the M9, which includes only the serial number. In view of the momentum already generated by this specification, the need for interservice compatibility, and the reasons listed above, there is very little justification for etching anything other than the serial number.

ETCHING PROGRAM OPTIONS

We found that the lack of early consensus has caused costly delays in the bar coding program. Because no requirement existed for bar coding weapons, the original procurement was awarded without consideration of it. As a result, the Services are now facing the imminent receipt of large quantities of uncoded weapons, which must be coded "on the fly" so as not to disrupt fielding schedules. Unfortunately, this will require costly stop-gap solutions until the situation can be remedied through the procurement system. In the meantime, we considered several options for etching the M9s as they are manufactured or received:

- Option 1: Modify the current acquisition contract to encode the weapons at the factory before they are packaged.
- Option 2: Purchase a single laser etcher to etch all M9s before they are delivered to the Services.
- Option 3: Award a service contract to have bar codes etched on all M9s before they are delivered to the Services.
- Option 4: Purchase individual etchers for each Service. Use the etchers to bar code the M9s and to etch other weapons or items.
- Option 5: Lease individual etchers for each Service.
- Option 6: Use the laser etcher at Hill Air Force Base (AFB) to bar code the M9s.

The options are not mutually exclusive; e.g., the acquisition contract might be modified to require laser-etched bar codes to be applied by the manufacturer, but some other means will still have to be used to bar code those weapons delivered prior to the modification. The options were compared on the basis of cost per weapon and also on the basis of the time required to implement an etching program utilizing the option.

Option 1: Modify the Current Contract.

Under this option the current acquisition contract would be modified to require that bar codes be etched on the weapons during production. The terms of the current contract require Level A packing (hermetically sealed for long-term storage) by Beretta. The weapons are purchased free on board (F.O.B.) origin (with government shipment to the individual Services) so they could be etched with minimal cost or delay before they are packed.

This is the most attractive option from the cost standpoint because it would eliminate the additional transportation and packing requirements inherent in the other options. The entire cost of this bar coding operation could be covered by a small increase of about \$1.00 in the purchase price of each pistol.

The main disadvantage of this option is that it will take a significant amount of time to implement. The contract modification must be negotiated and implemented before Beretta can acquire an etcher. Since deliveries from Italy will continue only until January 1987, it is unlikely that a contract change would affect any of the weapons assembled in Italy. Thus, no weapons delivered before February 1987 will be bar coded even if the modification is initiated immediately.

Option 2: Purchase a Single Laser Etcher For Joint Service Use

Under Option 2, a single laser etcher would be acquired and used to etch bar codes on all M9s after they are delivered from Beretta but before they are distributed to the Services. Since all M9s assembled in Italy are to be shipped through Dover AFB and since all U.S. assembled weapons will be shipped from Accokeek, MD, the etching site would have to be located in the Mid-Atlantic region to minimize transportation costs. The weapons would be shipped to the facility, unpacked, etched, repacked in Level A packaging and shipped to the appropriate Service. A lead Service would be designated to operate the facility, with reimbursement from the other Services on a cost-per-weapon basis.

The primary advantage of this alternative is that only one laser etcher would be needed. With a throughput capacity of 450 weapons per 8-hour workday (9,900 weapons a month), one laser etcher would be sufficient for the average monthly delivery quantity of 6,000 M9s. In only two months would deliveries exceed the throughput capacity (10,270 weapons in December 1986 and 11,630 weapons in January 1987). Utilizing overtime, the excess weapons could still be processed within their respective months.

The main disadvantage of this option is that a central etching site with adequate security, abundant floor space, and the facilities to repack M9s would also be necessary. Also, the leadtime to acquire an etcher is extensive (from 6 months if the etcher is leased to a year if purchased). Another disadvantage of this option is

that it makes no provision for routine re-etching of weapons at the individual Services' repair depots, which is a requirement for the long-range sustainability of the overall small arms bar coding program.

Option 3: Award a Laser-Etching Service Contract

This option involves contracting with a commercial firm to etch the weapons either at the contractor's facility or at a facility provided by the Government.

The advantages of this option are the quick startup time (we estimate 3 months leadtime is necessary for contract preparation and award) and the fact that no capital investment is necessary by the Services. Utilizing a contractor to laser-etch weapons greatly reduces the time necessary to begin etching production because the etchers are already owned and operated by the contractor.

Unfortunately, except for Option 6 (use of the Hill AFB etcher), this option is the most costly one considered. The cost estimates obtained from the very few laser-etching service contractors in the marketplace varied widely, but when added to the high cost of secure transportation, were in all cases much higher than in-house estimates. While most contractors are eager to etch the M9s at their own facilities, none has secure storage capabilities. In any case, the cost-per-weapon price for contract etching at the contractor's facility was among the highest computed, even without the costs of secure storage. One alternative explored was to move the contractor's operation to a Government-owned facility with secure storage space. Only one contractor was willing to do this and then only if the Government facility was in the Ann Arbor, MI, area. This geographic constraint caused a large increase in projected incremental transportation costs over all other in-house options (again, except for Option 6) on top of an already high-base cost for the service itself.

Option 4: Purchase Laser Etchers for Each Service

We considered an option under which each Service would purchase one laser etcher and collocate it with the weapon receiving site. The etcher would be operated by the Service. Advantages of this option are that it gives each Service the capability to bar code not only the M9, but other weapons, tools, parts, etc. (We have based our analysis of cost per weapon on the assumption that the etchers will be used to full capacity although the M9 workload will only represent a portion of total throughput.) Purchase of a laser etcher would also provide the capability to re-etch weapons after depot-level maintenance. Other than factory etching, this option offers the lowest cost per weapon of any option considered because it does not incur additional transportation costs.

The primary disadvantage of this option is the extensive leadtime required for a capital investment of this size. The etcher must be purchased under a competitive procurement since more than one manufacturer is capable of producing the appropriate equipment. The production leadtime for the equipment, once ordered, is approximately 4 months. The overall leadtime for the acquisition of a laser etcher by purchase is approximately 12 months. As a result of that leadtime, another source of laser-etching capability must be used during the interim period between the first M9 deliveries and the installation of each Service's laser etcher.

Other disadvantages are that repackaging will be necessary and that the Services will be "locked in" to a particular etching technology in a rapidly changing market.

Option 5: Lease a Laser Etcher For Each Service

Leasing a laser etcher provides the same benefits as purchasing one, but the acquisition leadtime is significantly reduced since capital funding is not required and administrative leadtime is shorter. In the case of laser etching the M9 pistol, leasing would reduce the amount of time that a costly stop-gap etching source would

have to be used pending arrival of a purchased etcher. It would also reduce the impact of technological obsolescence since no amortization of a large capital investment is involved. If, however, there is a continuing requirement for the equipment, the buyout provision can be exercised at the end of 5 years.

While a lease eliminates some of the problems associated with capital investment, unless there are substantial savings to be gained through the faster procurement process, it is somewhat more expensive than an outright purchase. Thus, it would require a contracting officer's decision with supporting rationale in accordance with the DoD Federal Acquisition Regulation Supplement (7.401).

Option 6: Use the Hill AFB Laser Etcher

Hill Air Force Base, UT, is currently programmed to laser etch bar codes on Air Force M9 pistols. A laser etcher is in place now and can be used to etch bar codes on weapons with the purchase of approximately \$5,000 worth of software. The Air Force has offered to laser etch M9 pistols and to package them in sets with collateral equipment (in accordance with the "total package/unit material fielding" configuration) for the other Services for a fixed price per pistol.

The overriding advantage of this option is that it is immediately available – the only option that is. Since deliveries have already begun and fielding schedules cannot be changed, it is imperative to have such a capability if all weapons are to be etched prior to fielding. The weapons can be transshipped from Dover AFB to Hill AFB via Military Airlift Command, which is less expensive than secure commercial transportation. This is especially true if other Services ship their weapons together with the Air Force weapons, thereby transferring the break bulk function from Dover AFB to Hill AFB. Hill AFB can also provide an adequate level of secure storage and can repack the weapons to Level A standards.

The main disadvantage of this option is its cost. Hill AFB has quoted a price of \$3.75 per M9 for receipt, etching, and repackaging in Level A pack. This is

extremely high in comparison with the cost of most other options and does not include the incremental cost of transportation to Hill AFB. The other disadvantage is that the Air Force has indicated that the maximum throughput for the laser etcher at Hill AFB is 250 pistols per day (5,500 per month), which may cause a backlog if all Services utilize this option. Both cost and throughput estimates seem to be very conservative and should be re-examined once production has begun.

COMPARISON OF OPTION COSTS

Table 2-1 details the estimated cost per weapon for the options described above. The amortization period, operator and maintenance costs, and the throughput estimates were determined from the DoD Laser-Etched Weapons Test Report. The packaging cost was obtained from packaging experts at Rock Island Arsenal. Based on inquiries with several equipment vendors, we found that the capital investment for an appropriately equipped laser etcher is approximately \$150,000, including material-handling attachments and heat exchanger. The lease costs of the same laser etcher, based on a 5-year lease, would be \$3,327 per month, with a \$15,000 purchase option. Finally, the service contract price per weapon, transportation costs, and leasing costs were based on informal quotations obtained from a variety of commercial vendors. For Options 4 and 5, the cost of the laser etcher is ammortized over 8 years by assuming that other applications will be found to share the cost; these costs are represented by showing the laser-etcher operating at full capacity of 9,350 weapons per month for 8 years even though the workload for the entire M9 program is only 6,000 weapons per month for 5 years.

Table 2-1 shows that Option 1, Modification of the Contract, would provide the lowest cost per weapon of any of the Options examined. However, that cost is only an estimate and not a formal proposal from Beretta. It does not include any profit or indirect costs that would certainly be a part of any Beretta proposal. These options should be integrated into a comprehensive etching program both by comparing the

TABLE 2-1. COST COMPARISON

MONTHLY COSTS	OPTION 1 MODIFY CONTRACT	OPTION 2 SINGLE JOINT USE ETCHER	OPTION 3A SERVICE CONTRACT OUT-HOUSE	OPTION 3B SERVICE CONTRACT IN-HOUSE	OPTION 4 PURCHASE FOR EACH SERVICE	OPTION 5 LEASE FOR EACH SERVICE	OPTION 6 HILL AFB
Amortization (8 years)	\$1,563	\$ 1,563	\$ 0	\$ 0	\$ 1,563	\$ 0	\$ 0
Transportation	0	1,500	9,923	7,500	0	0	8,250
Operators	4,467	4,467	0	0	4,467	4,467	0
Maintenance	27	27	0	0	27	27	0
Lease (amortized present value)	0	0	0	0	0	1,726	0
Etching charges	0	0	7,500	8,600	0	0	20,625
Secure storage	0	0	UNKNOWN	0	0	0	0
Packaging	0	8,700	7,250	7,250	13,558	13,558	INCLUDED
TOTAL	\$6,056	\$16,256	\$24,673	\$23,350	\$19,615	\$19,778	\$28,875
Facility capacity (weapons per month):							
Net cost per weapon	\$1,0094	\$2.7094	\$4.9345	\$4.6700	\$2.0979	\$2.1153	\$5.2500

Purchase Cost of Etcher: \$150,000
 Operators Required Per Etcher: 2
 Contract Charge Per Weapon (Opt 3a): \$1.50
 Contract Charge Per Weapon (Opt 3b): \$1.72
 Level A Packaging Per Weapon: \$1.45

Lease Cost Per Month: \$3,327
 Cost of 5-year Buyout: \$15,000
 Present Value of Lease: \$165,703
 USAF Charge Per Weapon: \$3.75

costs per weapon and by considering the respective leadtimes necessary to begin operation, in light of the established fielding schedule.

3. RECOMMENDATIONS

Because of the substantial arguments for the adoption of the serial number as the only data field to be encoded, we strongly recommend that this be done DoD-wide. It is our view that intraservice compatibility is far more important than the marginal benefit that more data could provide.

In view of the recognized advantages of bar coding, we recommend that the LOGMARS Senior Advisory Group establish a DoD-wide policy on the bar coding of small arms. In accordance with this policy, all future small arms procurements should be bar coded with only the serial number as part of the manufacturing process, and this requirement should be a part of the original solicitation. Finally, the durability issue should be resolved by the fastest means possible, and the U.S. Army should proceed as soon as possible to modify the M9 procurement contract (Option 1) to provide bar coded pistols to all DoD activities. Delay simply means the necessity of using the vastly more expensive stop-gaps for a longer period of time.

While a DoD-wide approach to bar coding the 9mm Personal Defense Weapon is the preferred method for overall cost considerations, it must be recognized that each Service at present is at a different stage of development with regard to the small arms bar coding program. Therefore, a separate recommendation for each Service is necessary and is given below.

MARINE CORPS

The most cost-effective place to bar code Marine Corps 9mm pistols is at the factory. Therefore, we recommend that the Marine Corps vigorously pursue a modification to the 9mm procurement contract to achieve this, even if only Marine Corps weapons are etched (Option 1). In the interim, assuming an effective date in 1987 for the contract modification, we recommend a twofold approach. First, because

of the difference in procurement leadtimes, leasing an etcher has a lower total life cycle cost than purchasing one. The Marine Corps should lease a laser etcher (Option 5) for installation at the Marine Corps Logistics Base, Albany, GA. All pistols delivered to the Marine Corps before the contract modification becomes effective and after installation of the etcher, should be etched at Albany. Second, those pistols delivered before installation of the etcher at Albany should be etched by the Air Force at Hill AFB (Option 6). Should either the Albany etcher or the contract modification be effective earlier than anticipated, the etching program should be immediately shifted to the lower-cost option. For the same reason, if fielding can be delayed until more cost-effective etching facilities are in place, substantial savings may be realized.

AIR FORCE

For the same reasons as for the Marine Corps, the Air Force should aggressively pursue the bar code contract modification as soon as possible (Option 1). In the interim, Air Force pistols should be bar coded at Hill AFB (Option 6). Once production begins, and actual cost figures are available, the Air Force should examine its pricing strategy with the intent of reconciling the price per weapon etched at Hill AFB with the much lower anticipated cost per weapon at Marine Corps Logistics Base, Albany.

ARMY

In the interests of efficiency, security, and interservice compatibility, the Army should participate in the laser-etching program, and it should pursue the contract modification as early as possible (Option 1). In the interim, an etcher should be leased for Letterkenny Army Depot, Chambersburg, PA (Option 5); all pistols delivered after installation of the etcher and before the delivery of factory-etched pistols should be etched there. Those pistols delivered before the installation of the etcher should be etched at Hill AFB (Option 6).

NAVY

Most of the Navy weapons are scheduled for delivery late enough to be etched under the provisions of the production contract modification. Uncoded weapons could be easily diverted to an existing etching site for etching by one of the other Services prior to final transportation (Option 6). This etching should be accomplished by an Interservice Service Agreement on a cost-per-weapon basis.

APPENDIX
M9 DELIVERY SCHEDULE

MONTH	YEAR	MONTHLY DELIVERIES					TOTAL
		Army	AF	USMC	USMC (R)	USN	
Feb	86	250		250			500
Mar	86	600	500	100			1,200
Apr	86	500	570	1,630			2,700
May	86			3,250			3,250
June	86			4,000			4,000
Jul	86			200	4,000		4,200
Aug	86		3,700		800		4,500
Sep	86	2,070	3,730		200		6,000
Oct	86	1,900	3,000			1,100	6,000
Nov	86	6,700					6,700
Dec	86	6,700		3,570			10,270
Jan	87	7,130		3,400		1,100	11,630
Feb	87		2,970	3,030			6,000
Mar	87		6,000				6,000
Apr	87		6,000				6,000
May	87	1,970	4,030				6,000
Jun	87	6,000					6,000
Jul	87	6,000					6,000
Aug	87	6,000	-				6,000
Sep	87	5,430		570			6,000
Oct	87			1,900		2,600	4,500
Nov	87			6,000			6,000
Dec	87			6,000			6,000
Jan	88			6,000			6,000
Feb	88		4,289	1,711			6,000
Mar	88		6,000				6,000
Apr	88		6,000				6,000
May	88		6,000				6,000
Jun	88	3,789	2,211				6,000

MONTH	YEAR	MONTHLY DELIVERIES					TOTAL
		Army	AF	USMC	USMC (R)	USN	
Jul	88	6,000					6,000
Aug	88	6,000					6,000
Sep	88	5,430	570				6,000
Oct	88			5,000			5,000
Nov	88			6,000			6,000
Dec	88			6,000			6,000
Jan	89		1,388	4,612			6,000
Feb	89		600			5,400	6,000
Mar	89		6,000				6,000
Apr	89		6,000				6,000
May	89		6,000				6,000
Jun	89	5,988	12				6,000
Jul	89	6,000					6,000
Aug	89	6,000					6,000
Sep	89	5,430		570			6,000
Oct	89			5,000			5,000
Nov	89			5,000			5,000
Dec	89			1,612		3,388	5,000
Jan	90		1,648			3,352	5,000
Feb	90		5,000				5,000
Mar	90	2,648	2,352				5,000
Apr	90	5,000					5,000
May	90	5,000					5,000
Jun	90	5,000					5,000
Jul	90	5,000					5,000
Aug	90	5,430					5,430
TOTALS		123,965	84,000	75,975	5,000	16,940	305,880

END

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